petaFLOP Supercomputers

Why in News?

India is set to introduce 1**8 new petaFLOP** supercomputers **dedicated to** weather forecasting**, aiming to enhance the accuracy and resolution** of weather predictions.

- These state-of-the-art machines will significantly **improve forecasting capabilities** at the block level, **predict cyclones with greater accuracy and lead time,** and provide detailed **ocean state forecasts.**

What are FLOPs in computing?

- **About:**
  - **FLOPs, or Floating-Point Operations per Second**, is a **metric** used to measure **computational performance and efficiency** in high-performance computing (HPC) **and** artificial intelligence (AI).
  - Floating-point operations involve mathematical calculations with real numbers that have fractional parts.
  - Using floating-point encoding, extremely long numbers can be handled relatively easily.
- **Significance**:
  - FLOPs are not the sole metric to evaluate a computer's performance. Factors like **memory bandwidth, latency, and architectural features also contribute.**
    - However, FLOPs provide a baseline for comparing computational capabilities, particularly in **tasks dominated by floating-point calculations.**
- **Unit of Computing Speed:**
  - **Teraflops:**
    - It is a unit of computing speed equal to **one million million (1 trillion) (10^12) FLOPS.**
  - **Petaflops:**
    - It is a unit of computing speed equal to **1000 TFLOPS (10^15).**
  - **Exaflops:**
    - It is a unit of computing speed equal to **one billion billion (10^18) FLOPS.**
- **India's Current Usage of petaFLOPs:**
  - The **National Centre for Medium-Range Weather Forecasting (NCMRWF)** houses **'Mihir,' a 2.8 petaFLOP supercomputer,** while the **Indian Institute of Tropical Meteorology (IITM) houses 'Pratyush,' a 4.0** petaFLOP supercomputer.
  - These existing supercomputers, launched in 2018, will be decommissioned once the new petaFLOP supercomputers are introduced.
  - As per the agreement, NCMRWF will receive eight PFLOPs of computing power, while the remaining ten PFLOPs will be allocated to IITM, catering to their specific weather forecasting requirements.
  - India’s first supercomputer called **PARAM 8000 was launched in 1991.**

Note:

- The world’s fastest computer in terms of PFLOPs is the **Hewlett Packard Enterprise Frontier, or OLCF-5** with the capability to touch a **peak performance of 1,685.65.**

- **Airawat PSAI stands as India's largest and fastest AI supercomputing system**, with a remarkable speed of 13,170 teraflops.

Source: IE